

OCEAN GALES AND STORMS, JANUARY, 1930—Continued

Vessel	Voyage		Position at time of lowest barometer		* Gale began	Time of lowest barometer	Gale ended	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Highest force of wind and direction	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
North Pacific Ocean—Continued													
			° ' "	° ' "				Inches					
Courageous, Am. M. S.	Manila	Shanghai	20 17 N	120 55 E	11	1 p., 11	13	30.02	NNE	NNE, 6	NE	NNE, 9	
Emp. of Asia, Br. S. S.	Vancouver	Honolulu	31 35 N	148 54 W	11	2 p., 15	16	29.30	S	WSW, 8	W	W, 9	WSW-W.
Lubrico, Am. S. S.	Richmond	do	28 02 N	146 45 W	9	Noon, 10	10	29.58	E	SE, 9	SSE	SE, 9	SE-SSW.
Do	do	do	23 00 N	154 30 W	12	8 p., 12	13	29.68	SW	SW, 9	NW	NW, 10	SW-NW.
Kaisho Maru, Jap. S. S.	Muroran	Vancouver	49 50 N	151 00 W	12	2 a., 15	16	29.57	SE	E	E	E, 12	4 pts.
Hawaii Maru, Jap. S. S.	San Pedro	Yokohama	30 05 N	175 00 W	12	Noon, 15	17	29.57	NNW	NW, 8	NW	NW, 9	NW-WNW.
Wilhelmina, Am. S. S.	Honolulu	Seattle	45 08 N	131 16 W	13	8 a., 14	14	29.60	NW	E, 7	N	N, 9	
Tahchee, Br. S. S.	Shanghai	San Pedro	38 20 N	172 13 W	13	5 a., 13	14	28.96	W	W, 10	NW	NW, 11	W-NW.
Cingalese Prince, Br. M. S.	San Pedro	Yokohama	29 37 N	175 40 E	13	4 a., 14	14	29.85	WSW	WSW, 8	NW	NW, 9	WSW-W.
Seattle, Am. S. S.	Hakodate	Seattle	50 20 N	152 26 W	13	1 p., 16	16	28.81	E	E, 8	S	NE, 11	E-ENE.
Glentworth, Br. S. S.	San Pedro	Kobe	33 36 N	170 58 W	13	—, 16	21	29.08	N	WSW, 10	SW	W, 12	
Kurohime Maru, Jap. S. S.	Wakamatsu	Grays Harbor	50 00 N	158 30 W	14	1 p., 14	15	29.16	E	E, 7	E	E, 11	ESE-E.
Silvercedar, Br. M. S.	Sourabaya	San Francisco	33 22 N	164 00 W	14	11 p., 16	17	29.09	WSW	W, 8	WSW	WNW, 9	SW-W.
Pres. Harrison, Am. S. S.	San Francisco	Honolulu	27 49 N	147 00 W	15	10 a., 15	16	29.54	SW	SW, 8	NW	W, 10	SW-W.
Tahchee, Br. S. S.	Shanghai	San Pedro	38 07 N	158 55 W	16	6 p., 16	16	29.07	SSE	SSE, 10	SSW	SSE, 10	SSE-S.
Wilhelmina, Am. S. S.	Seattle	Honolulu	47 50 N	125 45 W	17	8 a., 17	17	29.54	E	E, 8	E	E, 9	E-ESE.
Cambrai, Am. S. S.	Manila	San Francisco	34 12 N	170 06 E	17	2 a., 17	17	29.25	WNW	WNW, 8	WNW	WNW, 11	Steady.
Choyo Maru, Jap. S. S.	Uraga	Coos Bay	47 09 N	168 40 E	18	4 p., 19	20	28.45	WSW	W, 7	SW	WSW, 10	WSW-W.
Toyama Maru, Jap. S. S.	Yokohama	Victoria	49 41 N	166 00 W	20	Mdt., 20	21	29.18	SE	ESE, 9	W	ESE, 9	ESE-SE.
Glentworth, Br. S. S.	San Pedro	Kobe	33 10 N	169 50 E	24	8 a., 24	24	29.52	S	N, 10	W	WNW, 12	WSW-NW.
Do	do	do	33 08 N	164 33 E	25	2 p., 25	26	29.52	S	S, 10	WNW	SW, 11	SW-NW.
Montana, Am. S. S.	Yokohama	Seattle	49 40 N	178 40 E	25	10 a., 25	26	29.32	ESE	ESE, 9	SE	ESE, 9	ESE-SE.
Modjerkoto, Du. S. S.	Balik	Los Angeles	33 20 N	155 20 W	28	2 p., 28	28	29.51	W	W, 8	SW	NW, 9	NW-WNW.
Tatsuno Maru, Jap. S. S.	Yokohama	San Francisco	40 40 N	152 29 E	29	4 p., 30	31	28.72	SE	SW, 8	SW	SSE, 9	
Ibukisan Maru, Jap. S. S.	do	do	39 58 N	150 25 W	29	Noon, 30	31	28.78	SSE	SW, 9	W	W, 10	
Montana, Am. S. S.	do	Seattle	50 20 N	159 48 W	30	Noon, 31	31	28.76	N	—, 8	NW	—, 9	N-N.
Pres. Taft, Am. S. S.	do	do	44 00 N	157 00 E	30	6 a., 30	31	29.18	E	SE, 11	ESE	SE, 11	E-SE.

NORTH PACIFIC OCEAN

By WILLIS E. HURD

A very unusual average pressure condition characterized the weather of the central and northern portions of the North Pacific Ocean during January, 1930. The Aleutian cyclone, which ordinarily appears centered over the Gulf of Alaska or nearly along the chain of the Aleutian Islands, now lay farther southward in midocean. To its eastward the California-Pacific anticyclone, although at times occupying its normal position, was for the most part restricted to extreme eastern and north-eastern waters. The average oceanic maximum of about 30.30 inches covered the upper eastern part of the Gulf of Alaska and British North America. The average barometer at Juneau and Kodiak was, respectively, 0.56 and 0.45 inch above the normal. This anticyclonic condition gave the lower Alaskan coast, as exemplified by Juneau, the clearest skies on record for any month. Over the central and west-central parts of the ocean, between latitudes 30° and 50° N., the low pressure was associated with extraordinary meteorological activity, marked by high winds, frequent rains, snows, and hail squalls, departures from the usual prevailing winds, and the extension of abnormally low monthly pressures into tropical latitudes. At Honolulu the negative pressure departure was slightly more than a tenth of an inch. At Midway Island the average pressure was 29.89 inches, which may be compared with the value of 29.81 inches in January, 1916, when the absolute minimum of record at that station occurred.

In the Far East more normal conditions prevailed. Several minor cyclones appeared in various parts of the sea, but during most of the month high pressure overlay China and the adjoining coastal waters, with the result that the northeast monsoon prevailed from the Eastern to the China Sea with few intermissions.

Barometric data for several island and coast stations in west longitudes, including Point Barrow on the Arctic Ocean, are given in the following table:

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level at indicated hours, North Pacific Ocean and adjacent waters, January, 1930

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Point Barrow ¹	30.25		30.70	27th	29.50	6th.
Dutch Harbor ¹	29.79	+0.15	30.58	2d	29.14	17th.
St. Paul ¹	29.82	+0.13	30.60	27th	29.00	13th.
Kodiak ¹	30.20	+0.56	30.64	26th	29.12	21st.
Midway Island ¹	29.89	-0.11	30.16	3d	29.50	29th.
Honolulu ²	29.89	-0.12	30.09	31st	29.72	28th.
Juneau ³	30.33	+0.45	30.74	14th	29.18	31st.
Tatoosh Island ⁴	30.05	+0.11	30.57	20th	29.36	4th.
San Francisco ⁴	30.04	-0.05	30.36	21st	29.65	10th.
San Diego ⁴	30.03	-0.03	30.29	22d	29.75	11th.

¹ P. m. observations only.² For 26 days.³ And on 28th.⁴ For 30 days.⁵ A. m. and p. m. observations.⁶ Corrected to 24-hour mean.

Few, if any, months since our special studies of the weather of the North Pacific Ocean began have been so generally stormy as was January, 1930, winds of storm to hurricane force in themselves occurring on at least 11, and probably more, days. On the American-Hawaiian routes, though none of the deep cyclones characteristic of more westerly areas occurred there, several active depressions formed and the accompanying gales of force 8 to 10 were encountered on at least 13 days out of the first 16 of the month. These were largely experienced some 10 to 20 degrees northeast of the islands, the frequency lessening considerably thence toward the California coast. In the vicinity of Hawaii gales occurred on the 13th and 15th, being of force 10 from the northwest in the lee of Oahu Island on the 13th. At Tatoosh Island, Wash., winds of force 11 were registered at the Weather Bureau station on the 16th and 17th, and lesser high velocities on several other days. Over the eastern part of the ocean there were fewer days with gales on the upper than on the lower routes this month. The easternmost gales to attain hurricane force occurred on the 15th near the fiftieth parallel between 150° and 160° west longitude. This was in the region of greatest pressure gradient between the Alaskan anticyclone and the extensive mid-Pacific cyclone of that date.

The area of most intense and longest-sustained storm energy was embraced between latitudes 30° and 50° N., and longitudes 170° W. and 155° E. Here the Aleutian Low largely concentrated, and into this vast expanse of depressed barometer poured the most of the moderate disturbances which originated in Asia and in Asiatic waters. Here on no less than 10 days winds of major intensity—force 11 to 12—were developed, beside whole gales on several days, and fresh to strong gales almost daily throughout the month. Here also individual pressure readings were made at times that were practically an inch lower than the minima of about 29 inches observed at either Dutch Harbor or St. Paul in the heart of the normal winter low pressure region. Between longitudes 180° and 170° W. winds of storm to hurricane force were encountered on the 2d, 4th, 10th, 13th, 16th, and 17th, and west of 180° on the 1st, 2d, 4th, 24th, 25th, and 30th. The first four days of January formed an exceptionally stormy period, the severe weather covering an immense area. From the 13th to 17th another period of sustained severity occurred, this one irregularly affecting half the ocean, but concentrating its greatest energy between the thirtieth and fortieth parallels north of Midway Island. After the 25th the weather moderated in east longitudes, although on the 29th and 30th wind forces of 10 or 11 were reported from small areas at steaming distances of a day or two east of Japan.

Strong northeast monsoons of force 7 to 9 were reported on several days along the entire China coast.

In the Gulf of Tehuantepec northers of force 8 to 9 were reported by seamen on the 3d, 4th, 5th, 23d, 24th, 30th, and 31st. At the port of Salina Cruz Tehuantepecers of force 9 were reported on the 3d, and of force 10 on the 4th, 5th, 10th, 23d, and 30th.

The unwonted pressure alinement over the Pacific caused the prevailing wind at Honolulu to be from the north for the first time on record for any month since

the establishment of the station in 1904. The maximum velocity was at the rate of 35 miles an hour from the southwest on the 15th, during the prevalence of the low pressure wave which covered the greater part of the ocean.

Fog occurred on only two or three days over the western part of the ocean. Over the eastern part fog was scattered, but formed on three to five days in some localities along the northern and central routes. On the coast of the United States there was a considerable decrease from that of December, the occurrence off middle California falling from about 50 to about 20 per cent, and from about 25 per cent to 10 or lower north and south of this central coastal area.

PAMPERO

The following account of a pampero which occurred on January 1, 1930, at the mouth of the Parana River, Paraguay, was furnished to the Weather Bureau by Mr. W. A. Farrell, second officer and observer of the British tanker *San Macedonio*, Capt. J. W. Tozer, Rio de Janeiro to San Pedro, via Buenos Aires:

January 1, 1930, 4 p. m., civil time, whilst proceeding up the Parana River about 10 miles from where it enters the River Plate, the sky was observed to be very heavy with thundershowers to the west. Thunder and lightning were observed for one hour before the pampero struck the ship.

The pilot advised all awnings to be taken in, and at 4 p. m. with a rush and a roar from the SSE. the wind and rain came at hurricane force, it being so strong that it steered the ship toward the weather bank of the river (this being a tanker with the funnel aft, the funnel acted as a sail and caught most of the wind above the trees). The engines were put full astern and the anchor let go, and the ship swung across the river head to wind, there being plenty of room at this part of the stream. It continued to blow for quarter of an hour with the temperature at 66°, which was a drop of 22° in as many minutes, the barometer remaining steady at 29.52. The wind then eased off, and the barometer slowly rose, but fairly heavy rain continued until midnight. Through the rain was seen a glorious orange sunset low down on the horizon. By morning the sky was perfectly clear and the barometer had risen to 29.60, the ship being now with an ESE. breeze, force 4.—*W. E. H.*

CLIMATOLOGICAL TABLES

DESCRIPTION OF TABLES AND CHARTS

Table 1 gives the data ordinarily needed for climatological studies for about 184 Weather Bureau stations making simultaneous observations at 8 a. m. and 8 p. m. daily, seventy-fifth meridian time, and for about 31 others making only one observation. The altitudes of the instruments above ground are also given.

Beginning January 1, 1928, movement and velocity of the wind are printed as recorded by the 3-cup anemometer which has replaced the 4-cup pattern.

Table 2 gives, for about 37 stations of the Canadian Meteorological Service, the means of pressure and temperature, total precipitation, depth of snowfall, and the respective departures from normal values except in the case of snowfall. The sea-level pressures have been computed according to the method described by Prof. F. H. Bigelow in the REVIEW of January, 1902, 30: 13-16.

CHART I.—*Temperature departures.*—This chart presents the departures of the monthly mean surface temperatures from the monthly normals. The shaded portions of the chart indicate areas of positive departures and unshaded portions indicate areas of negative departures. Generalized lines connect places having approximately equal departures of like sign. This chart of monthly surface temperature departures in the United States was first published in the MONTHLY WEATHER REVIEW for July, 1909, but smaller charts appear in W. B. Bulletin U for 1873 to June, 1909, inclusive.

CHART II.—*Tracks of centers of ANTICYCLONES;* and
CHART III.—*Tracks of centers of CYCLONES.* The

Roman numerals show the chronological order of the centers. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the observations at 8 a. m. and 8 p. m., seventy-fifth meridian time. Within each circle is also given (Chart II), the last three figures of the highest barometric reading, or (Chart III) the lowest reading reported at or near the center at that time, in both cases as reduced to sea level and standard gravity. The inset map of Chart II shows the departure of monthly mean pressure from normal and the inset of Chart III shows the change in mean pressure from the preceding month.

The use of a new base map for Charts II and III is begun with this issue. Instead of showing the 12-hour movement of cyclones and anticyclones, only the 24-hour movement is shown.

CHART IV.—*Percentage of clear sky between sunrise and sunset.*—The average cloudiness at each Weather Bureau station is determined by numerous personal observations between sunrise and sunset. The difference between the observed cloudiness and 100 is assumed to represent the percentage of clear sky, and the values thus obtained are the basis of this chart. The chart does not relate to the nighttime.

CHART V.—*Total precipitation.*—The scales of shading with appropriate lines show the distribution of the monthly precipitation according to reports from both regular and cooperative observers. The inset on this